

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-048399

(43)Date of publication of application : 23.02.1999

(51)Int.Cl.

B32B 15/08

B05D 7/14

B05D 7/24

C09D 5/22

C09D 7/12

(21)Application number : 09-205632

(71)Applicant : SEKISUI JUSHI CO LTD

(22)Date of filing : 31.07.1997

(72)Inventor : YASUI KATSUMI

(54) METALLIC BODY APPLIED WITH FLUORESCENT COATING

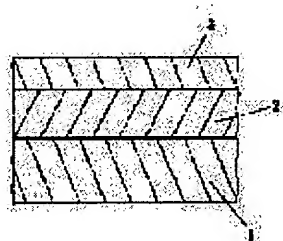
(57)Abstract:

PROBLEM TO BE SOLVED: To provide a metallic body applied with fluorescent coating which has resistance to scratching, and excellent resistance to chemicals and stains, and ability to maintain phosphorescent properties for an extended period, and which can improve scenery and appearance, and also improve resistance to corrosion.

SOLUTION: A resin coat 2 is formed by powder-painting on a metallic body 1, and an outer layer 3 is formed by painting a fluorescent paint on the resin coat 2, which makes two-layer construction. The fluorescent coating is composed by blending a 5-200 pts.wt. phosphor mainly composed of an inorganic compound to 100 pts.wt.

inorganic clear coating mainly composed of a silicone

compound, and a coloring pigment is also blended to make the color similar to the resin coat 2. Use of the phosphor mainly composed of the inorganic compound prevents deterioration of the phosphor, and painting with the similar color to the resin coat 2 improves scenery and appearance.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] It is the fluorescence paint metal body which 5-200 weight section combination of the fluorescent substance which uses an inorganic compound as a principal component to the clear coating 100 weight section of a minerals system at the clear coating of a minerals system with which said fluorescent paint uses a silicone compound as a principal component is carry out by form the resin paint film by powder coating in a metal body , and form the outer layer by fluorescent paint on this resin paint film , and is characterize by to are what a color pigment is blend and is color the resin paint film and the same color system .

[Claim 2] A color pigment is a fluorescence paint metal body according to claim 1 characterized by carrying out 0.01-5 weight section combination to the clear coating 100 weight section of a minerals system.

[Claim 3] The fluorescence paint metal body according to claim 1 or 2 characterized by blending with fluorescent paint the ultrafine particle-like silica whose particle size is 5-50nm further.

[Claim 4] Said ultrafine particle-like silica is a fluorescence paint metal body according to claim 3 characterized by carrying out 0.1-5 weight section combination to the clear coating 100 weight section of a minerals system.

[Claim 5] The fluorescence paint metal body according to claim 1, 2, 3, or 4 characterized by blending minerals system fibrous impalpable powder with fluorescent paint further.

[Claim 6] Said minerals system fibrous impalpable powder is a fluorescence paint metal body according to claim 5 characterized by carrying out 0.1-10 weight section combination to the clear coating 100 weight section of a minerals system.

[Claim 7] The fluorescence paint metal body according to claim 1, 2, 3, 4, 5, or 6 characterized by a resin paint film consisting of epoxy powder coatings, acrylic powder coatings, or polyester powder coatings.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is mainly used for inner sheathing of road related products, such as a guard fence for bridges, a road fence, and an indicator stanchion, and a building etc., and relates to the fluorescence paint metal body which can make fluorescence maintain over a long period of time.

[0002]

[Description of the Prior Art] For example, in inner sheathing of road related products, such as a guard fence for bridges, a road fence, and an indicator stanchion, and a building etc., in order to raise visibility and design nature, the fluorescence paint metal body which applied fluorescent paint on the surface of the metal body may be used. What blended the daylight fluorescent pigment created by dyeing a synthetic-resin particle conventionally the clear coating of an organic non-colored system as this kind of fluorescent paint by the fluorescent dye by organic coloring matter, such as a fluorescein, a rhodamine, acriflavine, and a chloro aluminum phthalocyanine, is common.

[0003]

[Problem(s) to be Solved by the Invention] However, since the fluorescent dye used for said daylight fluorescent pigment has the chemical structure or the electronic state which tends to be excited by light, such as irradiated ultraviolet rays, although it is excellent in early fluorescence, coincidence has the fault in which it will deteriorate in about one year and the fluorescence is lost from it being a very unstable organic compound in the usual condition to light. Therefore, also making fluorescence hold as much as possible is tried by giving two coats of fluorescent paint so that it may be set to 100-200 micrometers or more, and making the amount per unit area of a fluorescent pigment increase. However, since the fluorescent pigment was blended with the clear coating of an organic non-colored system, in order that this coating might penetrate completely the light which caused degradation, there was a limitation in degradation of that fluorescent pigment extending endurance early considering that two coats. Moreover, since the paint film obtained since the clear coating itself which blends a fluorescent pigment is an organic system had low surface hardness, it was easy to get damaged, and in chemical resistance and resistance to contamination, it was not able to be said that it was enough.

[0004] Moreover, although this fluorescent paint was generally directly applied to the metal body, since the color tone of this fluorescent paint had only blended the fluorescent pigment with the clear coating of an organic non-colored system, the coating color was the color tone of a fluorescent pigment, and most was thin yellowish green or White. Therefore, since it is finished in the color tone which starts on the ground color of the metal body which the fluorescence paint metal body obtained is also a little transparent, and is visible, to the product with which scene nature, such as a guard fence for bridges, a road fence, and an indicator stanchion, and fine sight nature are demanded, it is an unsuitable color tone and corrosion resistance sufficient by just the paint film by fluorescent paint is not acquired.

[0005] Then, the conventional trouble like the above is canceled, and a blemish cannot be attached easily, and this invention can be excellent in chemical resistance or resistance to contamination, and can make fluorescence maintain in the long run, and it uses as an offer plug the fluorescence paint metal

body which raised corrosion resistance while raising scene nature and fine sight nature moreover.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is considered as the following configurations. The resin paint film according [the fluorescence paint metal body concerning this invention] to powder coating to a metal body is formed, and the outer layer by fluorescent paint is formed on this resin paint film. Namely, said fluorescent paint 5-200 weight section combination of the fluorescent substance which uses an inorganic compound as a principal component to the clear coating 100 weight section of a minerals system at the clear coating of the minerals system which uses a silicone compound as a principal component is carried out. And it is characterized by being what a color pigment is blended and is colored the resin paint film and the same color system.

[0007] According to this invention, the fluorescent substance which uses an inorganic compound as a principal component is used as a fluorescent substance for making fluorescence discover. That is, a fluorescent substance cannot deteriorate from lightfastness and it being a stable inorganic compound chemically easily to the light irradiated, and can make fluorescence maintain in the long run.

[0008] moreover, from it being the coating of the minerals system used as a principal component, the coating itself which blends a fluorescent substance a silicone compound Since it is hard to get damaged since the paint film obtained has high surface hardness, and it excels in chemical resistance and resistance to contamination, are hard to deteriorate, and a pollutant cannot adhere easily, either, and the fluorescent substance in a paint film is further received from this. It will continue irradiating, without interrupting the light for exciting fluorescence with a pollutant, and this and fluorescence can be made to hold in the long run.

[0009] And since the color pigment is blended with fluorescent paint, light other than sufficient light to excite a fluorescent substance is intercepted by the color pigment and degradation of a fluorescent substance is controlled, the endurance of a fluorescent substance is extended and fluorescence can be made to hold in the long run further.

[0010] Furthermore, since it is the two-layer structure where the resin paint film was formed of the powder coating in which does not have generating of a pinhole etc. and a comparatively heavy-gage paint film is formed by one paint compared with a liquefied coating, and the outer layer by fluorescent paint was formed on it, corrosion resistance can be raised extremely. Moreover, since a color pigment is blended and it is colored the resin paint film and the same color system, even if as for the outer layer by fluorescent paint the color tone of a resin paint film is somewhat transparent and is in sight from an outer layer, various kinds of color tones which the color tone of an outer layer is not spoiled by it and given to the resin paint film, and the color tone of the outer layer given to the resin paint film and same color system by the color pigment can raise scene nature and fine sight nature conjointly.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. As one gestalt of operation of the fluorescence paint metal body concerning this invention is shown in drawing 1 , the resin paint film 2 by powder coating is formed in a metal body 1, and the outer layer 3 by fluorescent paint is formed on the resin paint film 2.

[0012] As a metal body used for this invention, although steel, aluminum, copper, zinc, other metals, those alloys, etc. are generally used suitably, the stainless steel excellent in corrosion resistance, galvanized steel, aluminum, etc. are used especially suitably. moreover -- if the configurations of a metal body may be pillar-shaped ** like plate-like, curved-surface tabular, the shape of a corrugated plate, a prism, or a cylinder, and what kind of configuration and are one of column-like things -- tubular -- cylindrical -- the -- others -- you may be what kind of variant cross section.

[0013] In order that the front face of said metal body may raise adhesion with a coating, cleaning processing is performed beforehand, dirt and oil may be removed, surface roughening of the front face may be carried out with sandblasting etc. with cleaning processing, or phosphate coats, such as phosphate by chemical conversion, may be formed, and the still better known primer layer may be formed.

[0014] In order to form the resin paint film by powder coating in a metal body, the method of

application is suitably applied for fluidized bed dip coating, thermal spraying, electrostatic coating, etc. that what is necessary is to carry out heating melting of the powder coatings which consist of synthetic resin on the surface of a metal body, and just to form a resin paint film. In addition, although especially the class of powder coatings used is not limited, generally epoxy powder coatings, acrylic powder coatings, or polyester powder coatings is used suitably.

[0015] In addition, while being able to form a resin paint film with thick thickness by one paint compared with a liquefied coating and being able to shorten paint time amount by forming the resin paint film by powder coatings in a metal body, generating of a pinhole etc. can be abolished and the corrosion resistance of the fluorescence paint metal body obtained can be raised. Moreover, by making the resin paint film by powder coating intervene between metal bodies, the adhesion of the outer layer by fluorescent paint can also be raised to a metal body.

[0016] Moreover, the fluorescent substance which makes the clear coating of a minerals system with which the fluorescent paint which forms an outer layer forms a paint film discover fluorescence, and a resin paint film and the color pigment made to color it a same color system are blended.

[0017] In this invention, the clear coating of the minerals system which forms a paint film It is what uses a silicone compound as a principal component. As a silicone compound The organic silicon compound simple substance or the organic silicon compound which generally uses siloxane association of silicone resin etc. as a principal chain, and alkyd, The thing like the silicone denaturation sol obtained by the reaction with the denaturation organic substance, such as epoxy, an acrylic, polyester, a phenol, a melamine, and urethane, etc. is used. Suitably The epoxy denaturation silicone sol as a printing mold which can shorten the setting time, a polyester denaturation silicone sol, or an acrylic denaturation silicone sol is used by carrying out heat hardening.

[0018] Moreover, in this invention, the fluorescent substance which makes fluorescence discover uses an inorganic compound as a principal component, and, generally adds rare earth oxides, such as heavy metal and europium, etc. to metallic oxides, sulfides, etc., such as aluminum, calcium, barium, magnesium, zinc, cadmium, and strontium, as an activator. Although the quality of the material, a configuration, and excitation wavelength are suitably determined according to the environment where the class of fluorescent substance used is applied, the diameter of a grain in consideration of the stirring nature to the inside of a coating, the workability of paint, the smooth nature of a paint film, etc. has desirable less than 30 micrometers.

[0019] In addition, the blending ratio of coal of said fluorescent substance carries out 5-200 weight section combination to the clear coating 100 weight section of a minerals system. Although the reason changes somewhat with conditions, such as a class of clear coating of a minerals system, a class of color pigment or its loadings, and the method of application, it is because fluorescence with the blending ratio of coal effective in under 5 weight sections is generally hard to be acquired, the solid content after hardening of a coating runs short if the 200 weight sections are exceeded, and it is hard coming to support a fluorescent substance. In addition, as for said blending ratio of coal, it is desirable to take the dispersibility and fluorescence to a coating into consideration, and to carry out 30-100 weight section combination suitably.

[0020] Furthermore in this invention, a color pigment is blended, and fluorescent paint is colored the resin paint film and the same color system by the color pigment. In addition, the color pigments blended may be inorganic pigments, such as a titanium dioxide, red ocher, and carbon black, and you may be organic pigments, such as a phthalocyanine system, and the Quinacridone system, an isoindolinone system, and the inorganic pigment and the organic pigment may be used together. In addition, when used for road related products, such as a guard fence for bridges, a road fence, and an indicator stanchion The color tone of the resin paint film by powder coating Dark grey, dark BURAUN, dark green, Consider as the Dark tones, such as dark blue, and the outer layer by fluorescent paint to black colors, such as carbon black of a minute amount, and furnace black, red ocher, While the dark clear tone, then appearance of said resin paint film and same color system serve as the Dark tone using the color pigment which added color pigments, such as a phthalocyanine system and the Quinacridone system, and excelling in scene nature and fine sight nature Light other than sufficient light to excite a

fluorescent substance by black colors, such as carbon black in a color pigment and furnace black, especially is intercepted effectively.

[0021] In addition, as for a color pigment, it is desirable that 0.01-5 weight section combination is carried out to the clear coating 100 weight section of a minerals system. Since much light will be intercepted beyond the need if the effectiveness of making the endurance of a fluorescent substance extending also becomes low and exceeds 5 weight sections conversely, since only a slight light is intercepted with about [that a color pigment cannot give a color tone to the extent that it expects under in the 0.01 weight section], and a color pigment, there is a possibility that it may become impossible to make fluorescence discover effectively.

[0022] In addition, in this invention, while raising the dispersibility, the thickening nature, the sedimentation tightness, and support nature of fluorescent paint, it is desirable that the ultrafine particle-like silica whose particle size which is the same presentation as a silicone compound as an additive which does not check the engine performance of a silicone compound is 5-50nm is blended further. Especially combination of this ultrafine particle-like silica is effective when specific gravity uses three or more fluorescent substances which are comparatively easy to sediment.

[0023] although the blending ratio of coal of said ultrafine particle-like silica changes with the blending ratio of coal of said fluorescent substance, the class of clear coating of a minerals system, the class of color pigment or its loadings, methods of application, etc. -- general -- the clear coating 100 weight section of a minerals system -- receiving -- 0.1 - 5 weight section and carrying out 0.5-2 weight section combination suitably -- a proper coating -- description can be acquired.

[0024] While controlling generating of the crack by external force etc. in this invention, in order to raise the dispersibility and orientation on the front face of a paint film of the improvement in on the strength, and a fluorescent substance, it is still more desirable that minerals system fibrous impalpable powder generally used, such as a boric-acid aluminum whisker, a potassium titanate whisker, an alumina fiber, and a glass fiber, is blended with fluorescent paint. It is effective if 0.1-10 weight section combination is carried out to the clear coating 100 weight section of a minerals system as the blending ratio of coal of minerals system fibrous impalpable powder.

[0025]

[Example] Next, the example of this invention is explained concretely. First, the clear coating of the non-colored minerals system as a basic coating with which 5 weight sections combination of the curing agent (Toagosei coronate 2515) was carried out was created to the acrylic denaturation silicone sol (Toshiba Silicone TSR175) 100 weight section.

[0026] Next, the clear coating 100 weight section of this minerals system is received. (Example 1) 0.5 weight section addition of the ultrafine particle-like silica (Aerosil 200CF made from Japanese Aerosil) is carried out. After that the fluorescent substance (NP[by Nichia Chemical Industries, Ltd.]-108-03 empirical formula $0.8\text{BaO}; 1.0\text{MgO}; 8.0\text{aluminum}_2\text{O}_3; 0.1\text{EuO}; 0.5\text{MnO}$) which stirs for 30 minutes by 1000 rotations with an agitator, and discovers the green fluorescence as a principal component for an inorganic compound 50 weight sections, As a color pigment, the 0.1 weight section and the carbon black 0.1 weight section were added, respectively, ferrous oxide was again stirred for 20 minutes by 500 rotations with the agitator, and the color tone created the fluorescent paint of dark BURAUNKU rear **. On the other hand, after carrying out phosphoric-acid zinc processing of the galvanized steel sheet, performed polyester system powder coating of a dark BURAUN tone first, formed the resin paint film, carried out the spray coating cloth of said fluorescent paint on the resin paint film, it was made to harden for 20 minutes at 170 degrees with curing oven after 30-minute setting, the outer layer was formed, and the appearance created the fluorescence paint metal body of the example 1 by this invention of a dark BURAUN tone.

[0027] (Example 2) In said example 1, except having made into 5 weight sections the blending ratio of coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 2 by this invention of a dark BURAUN tone.

[0028] (Example 3) In said example 1, except having made into 95 weight sections the blending ratio of

coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 3 by this invention of a dark BURAU tone.

[0029] (Example 4) In said example 1, except having made into the 190 weight sections the blending ratio of coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 4 by this invention of a dark BURAU tone.

[0030] (Example 5) In said example 1, except having made the color tone of fluorescent paint into the dark blue clear tone for the color pigment blended with fluorescent paint as the copper-phthalocyanine-blue 0.5 weight section and the carbon black 0.1 weight section, and having formed the resin paint film by the polyester system powder coating of a dark blue tone, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 5 by this invention of a dark blue tone.

[0031] (Example 6) In said example 1, except having made the color tone of fluorescent paint into the dark-green clear tone by having made into the Phthalocyanine Green 0.5 weight section and the carbon black 0.1 weight section the color pigment blended with fluorescent paint, and having formed the resin paint film by the polyester system powder coating of a dark-green tone, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 6 by this invention of a dark-green tone.

[0032] (Example 7) In said example 1, except having added the minerals system fibrous impalpable powder 2.0 weight section which becomes fluorescent paint from a boric-acid aluminum whisker (Alvo REXX YS2 by Shikoku Chemicals Corp.) further, and having made the blending ratio of coal of a fluorescent substance into the 190 weight sections, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 7 by this invention of a dark BURAU tone.

[0033] (Example 1 of a comparison) In said example 1, except having applied to the galvanized steel sheet which carried out phosphoric-acid zinc processing of this fluorescent paint, without not adding a color pigment and an ultrafine particle-like silica at all to fluorescent paint, and forming a resin paint film directly, and having formed the outer layer, it was made the same as an example 1, and the fluorescence paint metal body of the example 1 of a comparison whose appearance is the color tone of a fluorescent substance mostly was created.

[0034] (Example 2 of a comparison) In said example 1, except having made into 3 weight sections the blending ratio of coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 2 of a comparison of a dark BURAU tone.

[0035] (Example 3 of a comparison) In said example 1, except having made into the 220 weight sections the blending ratio of coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 1, and the appearance created the fluorescence paint metal body of the example 3 of a comparison of a dark BURAU tone.

[0036] (Example 4 of a comparison) In said example 7, except having made into the 220 weight sections the blending ratio of coal of the fluorescent substance blended with fluorescent paint, it was made the same as an example 7, and the appearance created the fluorescence paint metal body of the example 4 of a comparison of a dark BURAU tone.

[0037] (Example 5 of a comparison) In said example 7, the blending ratio of coal of the minerals system fibrous impalpable powder which consists of a boric-acid aluminum whisker blended with fluorescent paint was made the same as an example 7 except having made the blending ratio of coal of the 5.0 weight sections and a fluorescent substance into the 220 weight sections, and the appearance created the fluorescence paint metal body of the example 5 of a comparison of a dark BURAU tone.

[0038] (Example 6 of a comparison) To the chlorotrifluoroethylene system fluororesin (Toagosei Who Ron FC110) 100 weight section, 5 weight sections addition of the curing agent (Toagosei coronate HX) was carried out, the clear coating of an organic system was created, 50 weight sections addition of the

fluorescent substance of an example 1 was carried out to the clear coating 100 weight section of this organic system, and fluorescent paint was created. And it applied to the galvanized steel sheet which carried out phosphoric-acid zinc processing of this fluorescent paint directly, the outer layer was formed, and the fluorescence paint metal body of the example 6 of a comparison whose appearance is the color tone of a fluorescent substance mostly was created.

[0039] Various measurement was performed about said examples 1-7 and the examples 1-6 of a comparison, examples 1-7 were shown in Table 1, and the result was shown in Table 2 about the examples 1-6 of a comparison, respectively. In addition, average film thickness shows the sum total thickness of a resin paint film and an outer layer. Moreover, in Table 2, since the solid content after desiccation of a coating (solid) ran short, and a paint film could not be formed completely but the paint film collapsed easily about the examples 3-5 of a comparison which carried out 220 weight sections combination of the fluorescent substance, measurement of a pencil degree of hardness, a CASS test, and fluorescence retention was not performed.

[0040]

[Table 1]

		実 施 例						
		1	2	3	4	5	6	7
蛍光塗料の配合割合	クリアー塗料	100	100	100	100	100	100	100
	蛍光体	50	5	95	190	50	50	190
	着色顔料	0.2	0.2	0.2	0.2	0.6	0.6	0.2
	超微粒子状シリカ	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	無機質系繊維状微粉末							2.0
樹脂塗膜		有り	有り	有り	有り	有り	有り	有り
平均塗膜厚 (μm)		100	85	110	120	100	100	120
鉛筆硬度		2H	2H	2H	3H	2H	2H	3H
キヤス試験		A	A	A	A	A	A	A
蛍光保持率 (%)		98	98	98	98	98	98	98
塗膜の平滑性		A	A	A	C	A	A	B
蛍光性 (mcd/m ²)		1250	125	2250	4400	1500	1500	4400

[0041]

[Table 2]

		比較例					
		1	2	3	4	5	6
蛍光塗料の配合割合	クリアー塗料	100	100	100	100	100	100
	蛍光体	50	3	220	220	220	50
	着色顔料		0.2	0.2	0.2	0.2	
	超微粒子状シリカ		0.5	0.5	0.5	0.5	
	無機質系樹脂粉末				2.0	5.0	
樹脂塗膜		無し	有り	有り	有り	有り	無し
平均膜厚 (μm)		40	85	125	125	125	40
鉛筆硬度		5H	2H	—	—	—	H
キャス試験		C	A	—	—	—	C
蛍光保持率 (%)		80	98	—	—	—	55
塗膜の平滑性		B	A	C	C	C	B
蛍光性 (mcd/m^2)		2500	35	5200	4400	4400	2500

[0042] About the measuring method shown in Tables 1-2, and its evaluation approach, it is as follows.

[0043] (Pencil degree of hardness) The scratch resistance of a paint film is investigated by the tear of the paint film when changing the hardness of **** of a pencil.

[0044] (CASS test) It applies to JIS-H -8861 correspondingly.

A: Completely with no change.

B: Generating of rust is accepted.

C: Generating of rust and bulging of a paint film are accepted.

[0045] (Fluorescence retention) Using the sunshine carbon arc LGT type weatherometer, the fluorescent brightness after a 2000-hour exposure was measured, and the retention (%) to early fluorescent brightness estimated.

[0046] (Smooth nature of a paint film) The magnitude of the irregularity of a paint film was measured with the surface roughness measuring instrument.

Less than A:10 micrometers.

B:10 micrometers or more, less than 30 micrometers.

It exceeds C:30 micrometers.

[0047] (Fluorescence) In the dark room, from the test piece, the black light of 20W was irradiated from the location of 20cm, and the brightness was measured using the luminance meter of two diopters of a lens.

[0048] All of the fluorescence paint metal body of the examples 1-7 by this invention have a pencil degree of hardness very higher than Tables 1-2, and excelling in a CASS test, fluorescence retention, and fluorescence is checked.

[0049] In addition, a comparison of the example 1 which is the 50 same weight sections, examples 5-6 and the example 1 of a comparison, and the example 6 of a comparison of the blending ratio of coal of a fluorescent substance checks that the example which blended the color pigment excels the example of a comparison which has not blended the color pigment in fluorescence retention.

[0050] Moreover, it is checked that corrosion resistance of the examples [in which the resin paint film by powder coating was formed] 1-7 improves by forming the resin paint film by powder coating in this invention since the result of a CASS test is excellent compared with the examples 1 and 6 of a comparison which do not form the resin paint film.

[0051] Since the result of a pencil degree of hardness is high compared with the example 6 of a comparison which used the coating of an organic system, when the examples 1-7 which furthermore used the coating of the minerals system which uses a silicone compound as a principal component for fluorescent paint use the coating of the minerals system which uses a silicone compound as a principal

component for fluorescent paint in this invention, it is checked that an outer layer stops being able to get damaged easily.

[0052] In addition, a comparison of the example 4 and example 7 which are the 190 same weight sections of the blending ratio of coal of a fluorescent substance checks that the example 7 with which minerals system fibrous impalpable powder was blended can raise the dispersibility and orientation on the front face of a paint film of a fluorescent substance by blending minerals system more nearly fibrous [than the example 4 with which minerals system fibrous impalpable powder is not blended] impalpable powder since it excels in the smooth nature of a paint film.

[0053] In addition, since it is excellent in a pencil degree of hardness and fluorescence retention since the fluorescent paint which blended the color pigment with the coating of the minerals system which uses a silicone compound as a principal component is used for the example 2 of a comparison, and it forms the resin paint film by powder coating, the CASS test is also excellent, but effective fluorescence is not acquired although the smooth nature of a paint film is excellent, since the blending ratio of coal of a fluorescent substance is slight.

[0054]

[Effect of the Invention] As explained in full detail above, according to the fluorescence paint metal body by this invention, the fluorescent substance which uses an inorganic compound as a principal component is used as a fluorescent substance for making fluorescence discover. That is, a fluorescent substance cannot deteriorate from lightfastness and it being a stable inorganic compound chemically easily to the light irradiated, and can make fluorescence maintain in the long run.

[0055] moreover, from it being the coating of the minerals system used as a principal component, the coating itself which blends a fluorescent substance a silicone compound Since it is hard to get damaged since the paint film obtained has high surface hardness, and it excels in chemical resistance and resistance to contamination, are hard to deteriorate, and a pollutant cannot adhere easily, either, and the fluorescent substance in a paint film is further received from this. It will continue irradiating, without interrupting the light for exciting fluorescence with a pollutant, and this and fluorescence can be made to hold in the long run.

[0056] And since the color pigment is blended with fluorescent paint, light other than sufficient light to excite a fluorescent substance is intercepted by the color pigment and degradation of a fluorescent substance is controlled, the endurance of a fluorescent substance is extended and fluorescence can be made to hold in the long run further.

[0057] Furthermore, since it is the two-layer structure where the resin paint film was formed of the powder coating in which does not have generating of a pinhole etc. and a comparatively heavy-gage paint film is formed by one paint compared with a liquefied coating, and the outer layer by fluorescent paint was formed on it, corrosion resistance can be raised extremely. Moreover, since a color pigment is blended and it is colored the resin paint film and the same color system, even if as for the outer layer by fluorescent paint the color tone of a resin paint film is somewhat transparent and is in sight from an outer layer, various kinds of color tones which the color tone of an outer layer is not spoiled by it and given to the resin paint film, and the color tone of the outer layer given to the resin paint film and same color system by the color pigment can raise scene nature and fine sight nature conjointly.

[Translation done.]